(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 841 130 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.05.1998 Bulletin 1998/20

(51) Int. Cl.[6]: **B26D 7/18**

(21) Application number: **97119338.8**

(22) Date of filing: **05.11.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **08.11.1996 IT BO960567**

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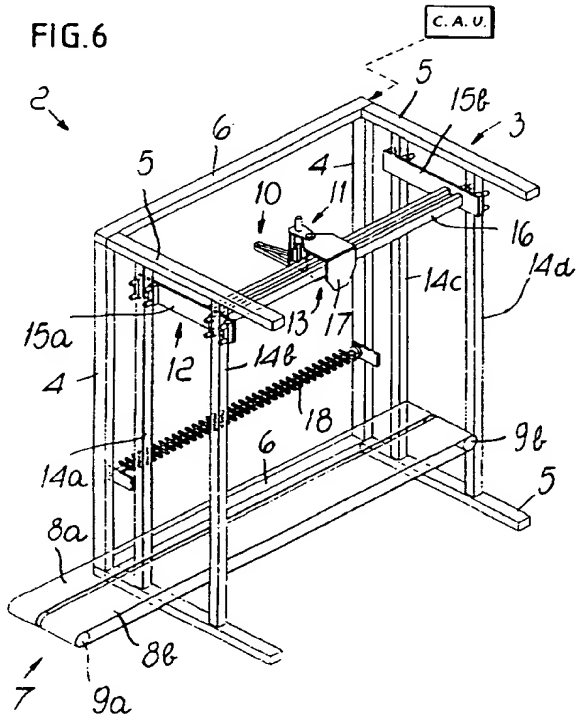
(54) Fabric ply mat cutting method for facilitating removal of cut pattern piece stacks and machine for automatically removing the stacks from a cutting table

(57) A method for cutting a mat (1) of plies of fabric in order to facilitate the removal of stacks (P) of cut pattern pieces, which consists of the fact that in addition to perimetrically cutting the contours of the various pattern pieces, additional cuts (T) are formed in the mat (1) which connect the various contours to each other and to the edges of the mat, the cuts (T) reducing the residues of the mat to small and mutually separate portions. The machine (2) for automatically removing the stacks (P) from a cutting table (CT) has a supporting framework (3) which is provided with elements for fixing to the table (CT); a conveyor belt (7) for removing the pieces, which is arranged at the base of the framework (3) directly to the side of the table (CT); grippers (10) for gripping and releasing the stacks (P) which are associated with movement elements (12,13) for producing lifting and lowering and translatory motion along a direction (F) which is parallel to the belt (7), the movement elements being controlled by a central control and actuation unit (C.A.U.) which can be programmed according to the shape and arrangement of the stacks (P) in the mat (1).

FIG.6



Description

The present invention relates to a method for cutting a mat of plies of fabric in order to facilitate the removal of stacks of cut pattern pieces and to a machine for automatically removing the stacks from a cutting table.

In the particular field of the cutting of pattern pieces of cloth for making items of clothing of any kind, cutting tables are currently used constituted by a platform on which a stack of a plurality of superimposed individual cuts of cloth, known as mat, is arranged; a film made of a material such as impermeable plastics is placed on the mat and intense suction is applied from below, compressing and packing the mat on the table: then a blade descends which is actuated so as to oscillate vertically in order to cut the mat of fabrics and so as to move on the plane along x-y coordinated axes in order to follow the contour of the individual pattern pieces to be cut.

The cutting operations are performed automatically and are controlled by an electronic computer, which is appropriately programmed in each instance with the data related to the contours to be cut and to their distribution in the mat.

Once the pattern pieces have been cut, it is necessary to remove the individual stacks of cut pieces from the mat; this operation is currently performed manually, with a considerable expenditure of time and labor: it has been observed, for example, that three or four people are needed in order to remove the cut stacks in the time required by an operator to perform the cutting operation; moreover, whereas cutting requires simply monitoring by personnel and interventions only in case of malfunctions and for the operations for loading the mat, removal of the stacks requires direct manual interventions in positions which are also awkward to reach.

Removal of the stacks of cut pieces is also hindered by the fact that the mat can be even considerably thick and that it is necessary to act from above: removal difficulties increase in the presence of small pieces having a reduced area.

The aim of the present invention is to obviate the mentioned drawbacks of conventional devices, i.e., to provide a method for cutting a mat of plies of fabric which allows to facilitate the removal of stacks of cut pattern pieces and to provide a machine which is capable of automatically removing the stacks from a cutting table.

An object of the present invention is to provide a cutting method and a machine for automatically removing the stacks which can be adopted in conventional cutting tables.

Within the scope of this aim, another object of the present invention is to achieve the above aim with a structure which is simple, relatively easy to provide in practice, safe in use, effective in operation, and has a relatively low cost.

This aim, these objects and others which will become apparent hereafter are all achieved by the present method for cutting a mat of plies of fabric in order to facilitate the removal of stacks of cut pattern pieces, characterized in that in addition to perimetrically cutting the contours of the various pattern pieces, additional cuts are formed in the mat which connect the various contours to each other and to the edges of the mat, said cuts reducing the residues of the mat to small and mutually separate portions.

The machine for automatically removing the stacks from a cutting table according to the present method is characterized in that it comprises: a supporting framework, which has elements for fixing to said table; a conveyor belt for removing the pattern pieces, which is arranged at the base of said framework directly to the side of said table; means for gripping and releasing the stacks, which are associated with means for lifting, lowering and shifting in a direction which is parallel to said belt; said means being controlled by a central control and actuation unit which can be programmed in relation to the shape and arrangement of the stacks in the mat in order to place the grip means at each individual stack, grip the stack, lift it, turn the grip means so that the grip front is parallel to said belt, and then release said stack onto the belt.

Further characteristics and advantages of the present invention will become apparent from the following detailed description of a preferred but not exclusive embodiment of a machine for automatically removing the stacks from a cutting table according to the present invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic perspective view of the sequence of the operating steps of a machine for automatically removing the stacks of cut pattern pieces according to the present invention;
figures 2, 3, 4 and 5 are schematic perspective views of the sequence of the various removal steps that affect a mat to which the method has been applied;
figure 6 is a schematic perspective view of the machine according to the invention;
figures 7 and 8 are perspective views of operating steps for gripping and releasing the gripper-type grip means of the machine;
figure 9 is a schematic perspective view of the assembly for inserting the mat in the machine according to the invention;
figure 10 is a schematic side view of the assembly of figure 9.

With particular reference to the above figures, the reference numeral 1 generally designates a mat of plies of fabric which has been cut appropriately so as to facilitate the removal of stacks P of cut pattern pieces according to the present invention.

In compliance with the method according to the

present invention, additional cuts T are formed in the mat 1, in addition to the perimetric cuts of the contours of the various pattern pieces, which are shown schematically in the figure as irregular pentagons but in practice have the shape required to make items of clothing; said additional cuts T connect the various contours to each other and to the edges of the mat, reduce the residues of the mat to small mutually separated portions and allow to remove the stacks frontally: advantageously, the cuts T are distributed in an orderly fashion in a grid and there is also provided a perimetric cut which allows to recover the covering film.

The reference numeral 2 generally designates a machine for automatically removing the stacks from a conventional cutting table (CT); said cutting table is provided with means for the frontal translatory motion of the mat which are suitable to make the mat advance stepwise in the direction of the arrow A as the stacks P are removed.

The machine 2 comprises a supporting framework 3 which is constituted by posts 4, longitudinal members 5 and cross-members 6 which are mutually welded at right angles to each other; said framework is provided with elements for fixing to the cutting table.

A conveyor belt 7 is mounted at the base of the framework 3 and to one side of the table in order to remove the pattern pieces in the direction of the arrow B; the belt 7 is of the kind constituted by two separate belts 8a, 8b which are mutually spaced and are wound around two parallel and horizontal rollers 9a, 9b which are associated with an actuation assembly, not shown in the figure, for the advantageously stepwise removal of the stacks P.

The reference numeral 10 generally designates means for gripping and releasing the stacks, which are preferably associated with means 11 for rotating about a vertical axis (arrow C), with lifting and lowering means 12 (arrows D and E), and with means 13 for translatory motion (arrow F) in a direction which is parallel to the belt 7: in the figure, as regards the rotation means 11, only the shaft about which the grip means 10 rotate has been shown; as regards the lifting and lowering means 12 and the translatory motion means 13, four vertical fixed guides 14a, 14b, 14c and 14d, two vertically movable longitudinal members 15a, 15b mutually connected by a longitudinal horizontal guide 16, along which a sliding block 17 is fitted so that it can slide, have been shown.

A longitudinal grid 18 of mutually parallel and spaced rulers is installed at the outlet of the cutting table and is associated with elements for oscillating about a longitudinal axis to lower and then discharge the mat portions which gradually become waste (figures 4 and 5).

The grip means 10, in the embodiment shown in figures 7 and 8, are of the gripper type tor frontally gripping the stacks; said gripper means, in a preferred embodiment, comprise two horizontal plates 19a, 19b which are mutually connected by two parallel vertical posts 20a, 20b; the end of a lower claw 21 is fixed below the plate 19b and an abutment 22 for the rear end of the upper claw 23 is mounted above; in a median position, the claw 23 is articulated, by means of a horizontal pivot 24, to a lower fork 25 of a sliding block 26 which is actuated so that it can slide vertically along the posts 20a, 20b by a jack with a vertical axis, the moving stem 27 whereof has been shown; at the rear end of the claw 23 there is provided a bearing 29, which is mounted by means of a bolt 28 and rests on the abutment 22, as well as a centering element for the top of a helical compression spring 30: the actuation of the stem 27 of the jack causes the lifting or lowering of the sliding block 26 and therefore the respective opening or closure of the gripper on the stack.

The claws 21-23 are meant to penetrate without interference between the parallel rulers of the longitudinal grid 18 (figure 3) and between the two belts 8a and 8b in order to easily remove and deposit the stacks.

The grip means 10 may also be of the top-suction type.

Figure 2 illustrates, in its upper portion, the sheet F1 and, in its lower portion, the sheet F2, which are made of paper or of a material such as plastics and are required to cut the mat; advantageously, the sheets F1 and F2 are eliminated before removing the stacks P.

All the described functional means are controlled by a central control and actuation unit (C.A.U.), which can be programmed according to the shape and arrangement of the stacks in the mat in order to place the grip means at each individual stack, grip the stack, lift it, rotate the grip means so that the grip front is parallel to the belt 7 and then release said stack onto the belt.

Necessarily, a point for gripping the stack of pattern pieces is defined for each one of the contours of the various pieces: the data related to said cuts, which are distributed in a grid pattern, and to said stack grip points are processed automatically, starting from the data defined for controlling the cutting elements of a conventional mat cutting machine, and produce a sequence of coordinated instructions for controlling said automatic mat cutting machine and the machine according to the present invention.

In other words, the file of the cutting program is processed directly and is supplemented with the data for cutting along the grid and with the data of the stack grip points.

It has been observed that at the outlet of the cutting table the longitudinal grid 18 of mutually parallel and spaced rulers does not allow to make the mat advance correctly in the direction of the arrow A: this advancement is in fact achieved by means of a conveyor belt which is wound on two co-planar rollers which are orientated parallel to the arrow F, and on which the mattress, especially the last part thereof, tends to slip.

In order to obviate this drawback, the rulers 18 have been provided with a plurality of freely rotating end pul-

leys 32 which are coaxial along a [redacted]ontal axis and on which respective secondary belts 31 are wound, closed in a loop and wound on respective pulleys 32a, 32b, 32c.

The reference numeral 33 designates the end portion of the mat conveyor belt; said belt is wound on a motorized roller 34 and a guiding roller 35 and is constituted by a plurality of strips which are rigidly coupled to each other and between which incisions are formed in which the secondary belts 31 are recessed: the motorization of the roller 34 is advantageously achieved by means of a coupling with sprockets 36-37 and a toothed belt 38.

A space remains between each one of the pulleys 30 and the adjacent pulley, and the lower claw 21 of the means 10 for gripping the stacks P can be inserted in said space.

It has thus been shown that the present invention achieves the intended aim and objects.

The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically equivalent ones.

In practice, the materials employed, as well as the shapes and the dimensions, may be any according to the requirements without thereby abandoning the scope of the protection of the appended claims.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A method for cutting a mat of plies of fabric for facilitating removal of stacks (P) of cut pattern pieces, characterized in that in addition to perimetrically cutting the contours of the various pattern pieces, additional cuts (T) are formed in the mat (1) which connect the various contours to each other and to the edges of the mat, said cuts (T) reducing the residues of the mat (1) to small and mutually separate portions.

2. A method according to claim 1, characterized in that said cuts (T) are distributed in an orderly fashion in a grid pattern.

3. A method according to claim 1, characterized in that a perimetric cut of the mat (1) is also formed which allows to recover the edge of the covering film (F1,F2) made of material such as plastics.

4. A method according to claim 1, characterized in that a grip point[redacted]e stack (P) of pieces is defined tor each one of the contours of the various pieces.

5. A method according to claims 2 and 4, characterized in that the data related to said cuts distributed in a grid pattern and to said stack grip points are processed automatically starting from the data defined for controlling the cutting elements of a conventional machine for cutting said mat (1) and produce a sequence of coordinated instructions for the control of said cutting machine and of the machine according to the present invention.

6. A machine for automatically removing the stacks (P) from a cutting table following the method according to one or more of the preceding claims, characterized in that it comprises: a supporting framework (3) which is provided with elements for fixing to said table (CT); a conveyor belt (7) for removing the pieces, which is arranged at the base of said framework (3) directly to the side of said table; means (10) for gripping and releasing the stacks (P) which are associated with means (12) for producing lifting and lowering and means (13) for translatory motion along a direction (F) which is parallel to said belt; said means (10,12,13) being controlled by a central control and actuation unit (C.A.U.) which can be programmed according to the shape and arrangement of the stacks (P) in the mat (1) in order to place the grip means (10) at each individual stack (P), clamp the stack, lift it and then release it onto the belt (7).

7. A machine according to claim 6, characterized in that said grip means (10) are associated with means (11) for rotating about a vertical axis (C) which are suitable to rotate the stack (P) before release onto the belt (7).

8. A machine according to claim 6, characterized in that said grip means (10) are of the gripper type for frontally gripping the stacks (P).

9. A machine according to claim 6 and as an alternative to claim 8, characterized in that said grip means (10) are of the top-suction type.

10. A machine according to claim 8, characterized in that said gripper-type grip means (10) comprise a plate (19b) below which the end of a lower claw (21) is fixed and above which an abutment (22) is mounted for the rear end of an upper claw (23) which is articulated, in a median position, to a horizontal pivot (24) below a sliding block (26) which is actuated so as to slide vertically above said plate by a jack having a vertical axis.

11. A machine according to claim 6, characterized in

that at the outlet of the cutting line there is provided a conveyor belt for inserting the front of the mat (1) which ends with a longitudinal grid (18) of mutually parallel and spaced rulers, between which said stack grip and release means (10) can be inserted, said rulers being provided with freely rotating end pulleys (32) which are coaxial along a horizontal axis and on which respective secondary belts (31) are wound, said belts (31) being closed in a loop and being wound around respective pulleys (32a,32b,32c).

FIG.1

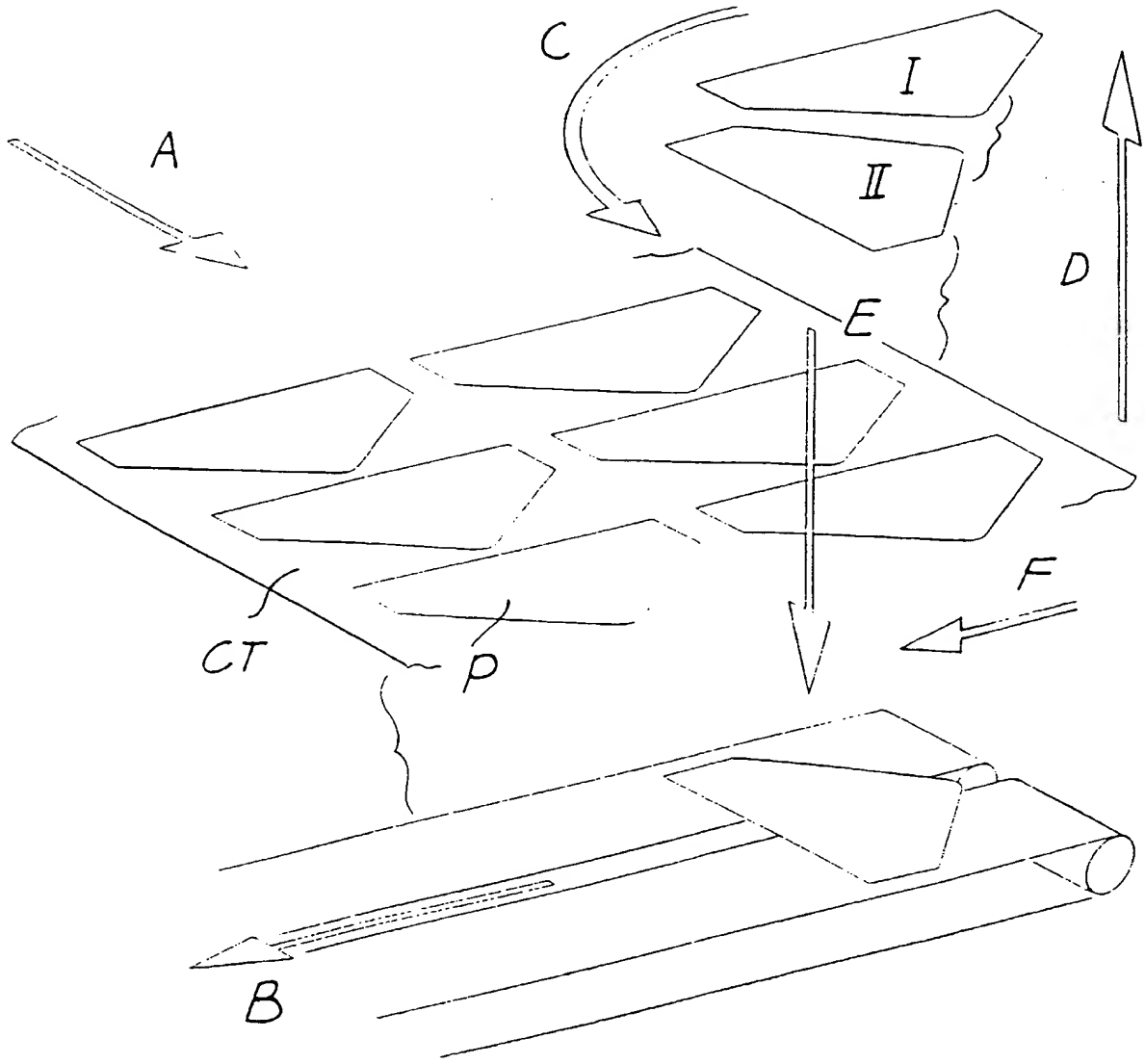
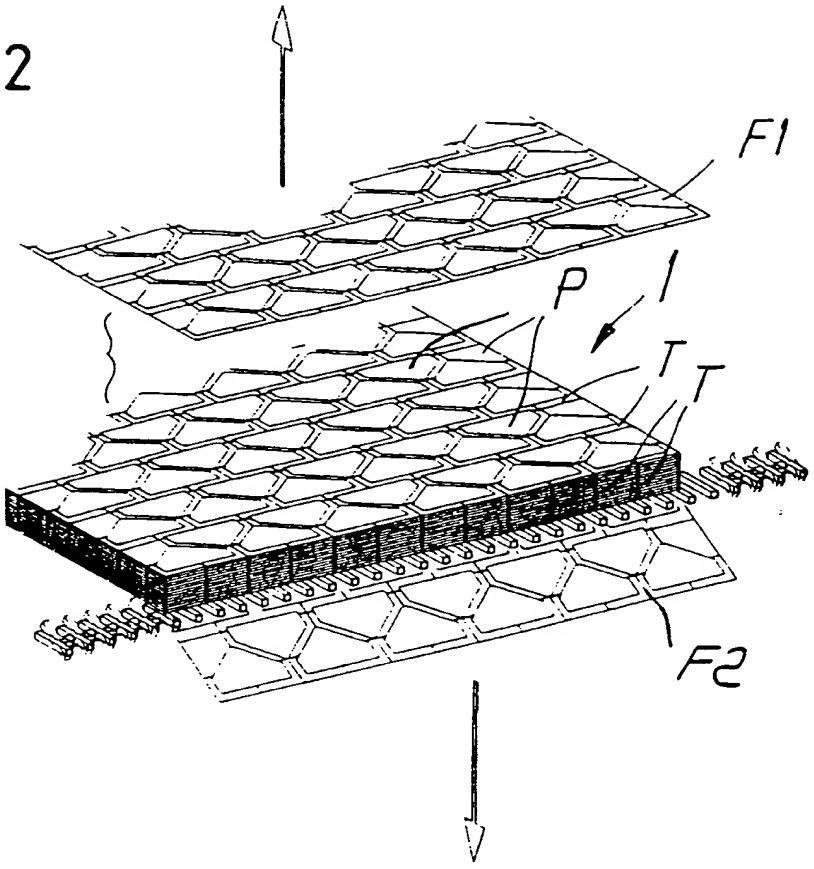


FIG.2



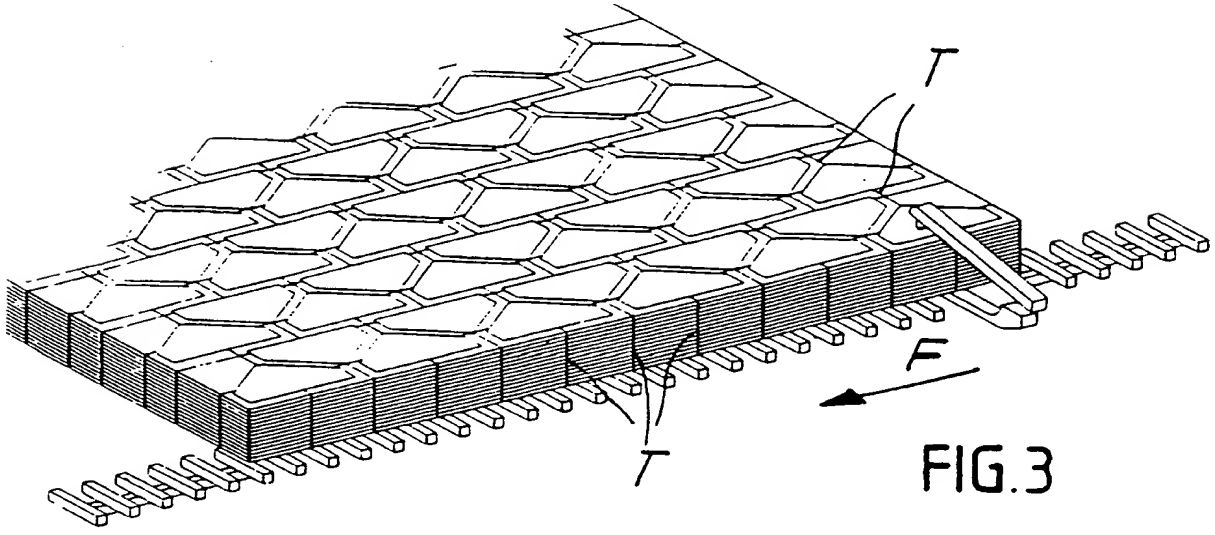


FIG.3

FIG.4

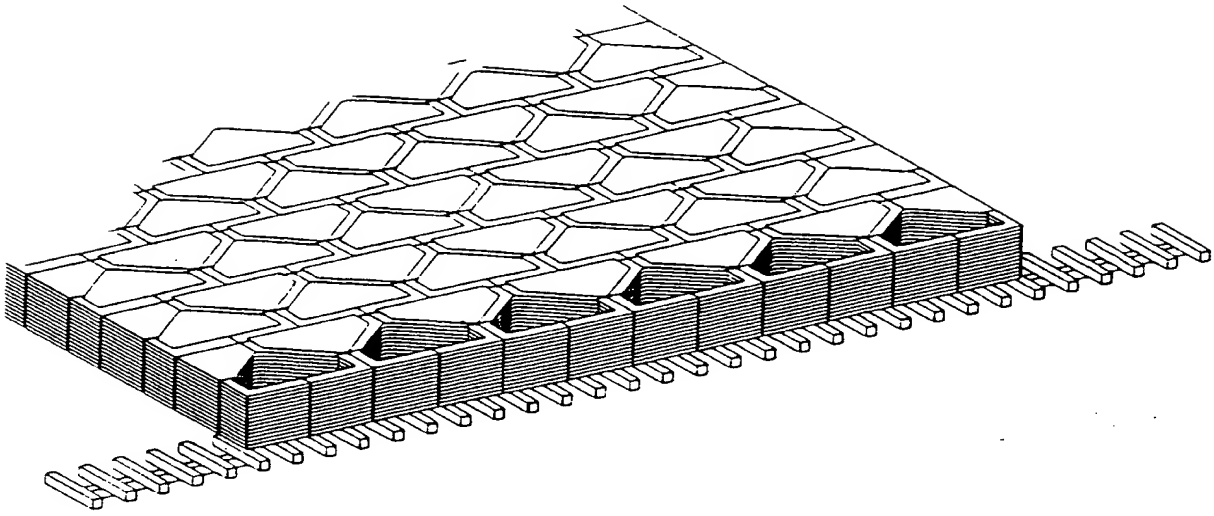


FIG.5

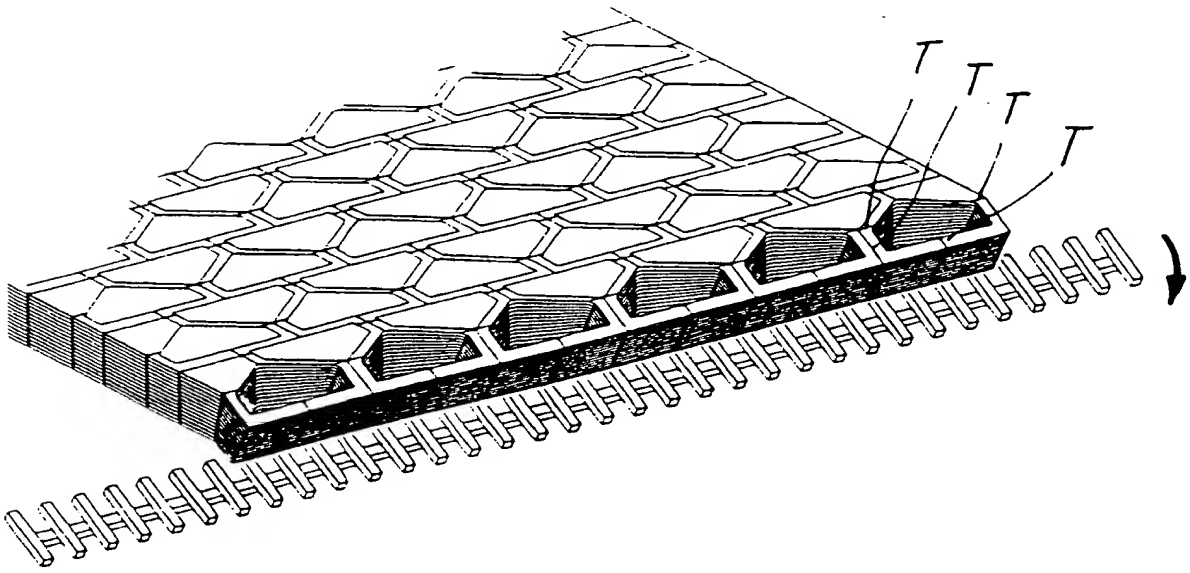


FIG.6

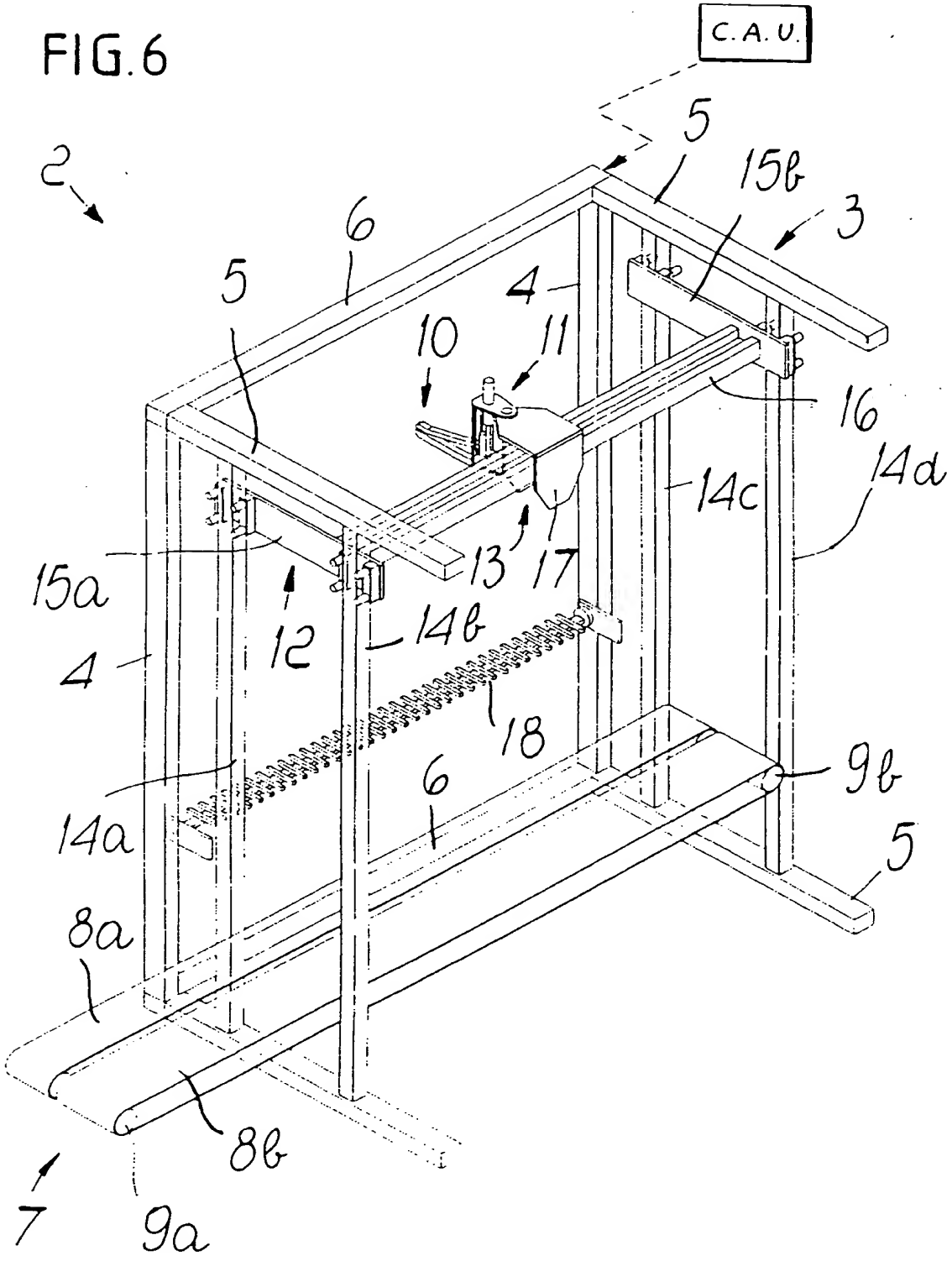

C.A.U.
2
5
15b
3
6
5
4
10
11
16
14d
14c
15a
13
17
12
14b
4
18
9b
6
14a
5
8a
8b
7
9a

FIG.8

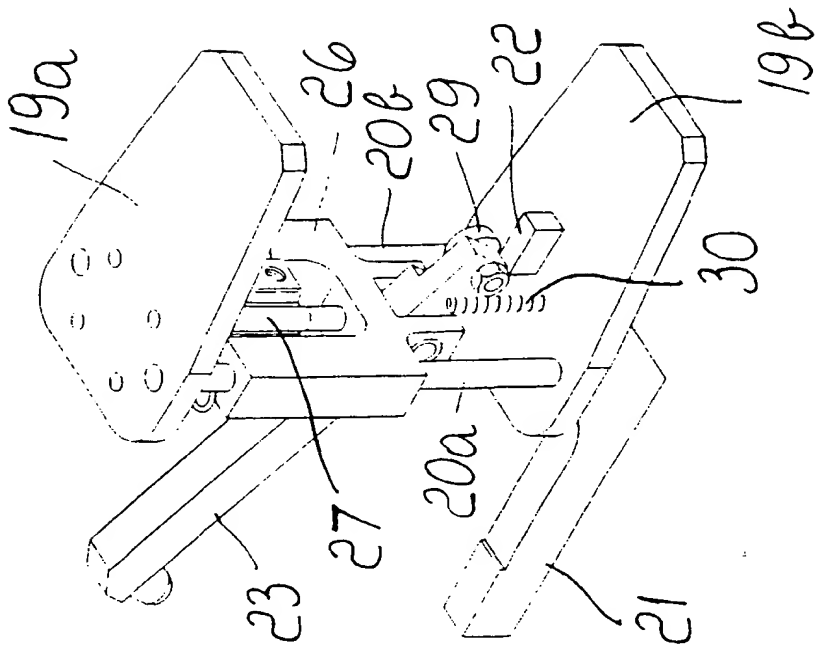
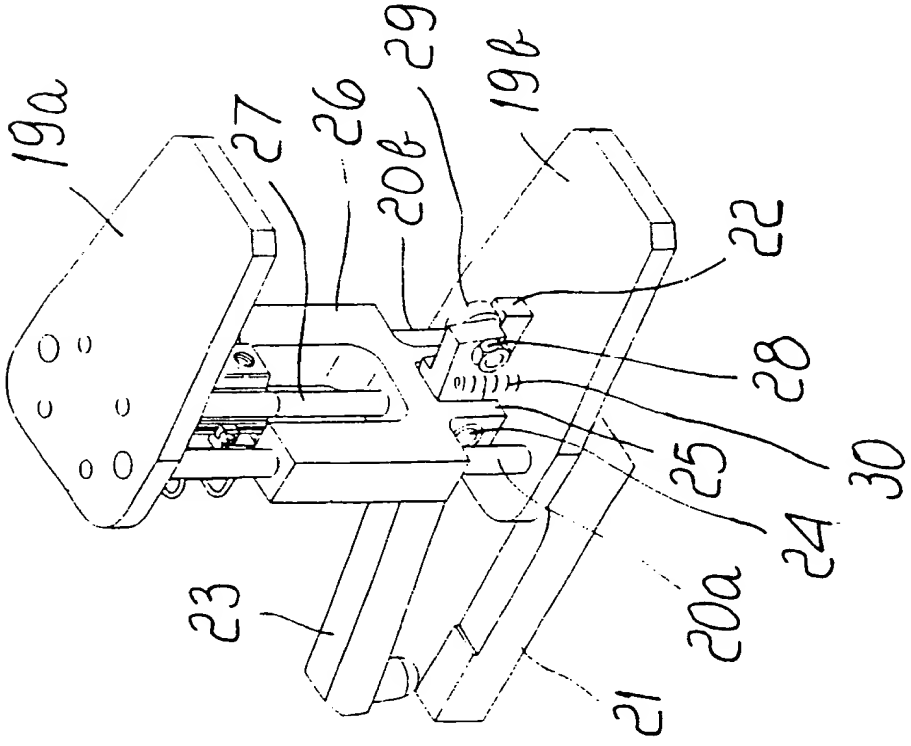

19a
26
20b
29
22
19b
30
20a
27
23
21

FIG.7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19b
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20a
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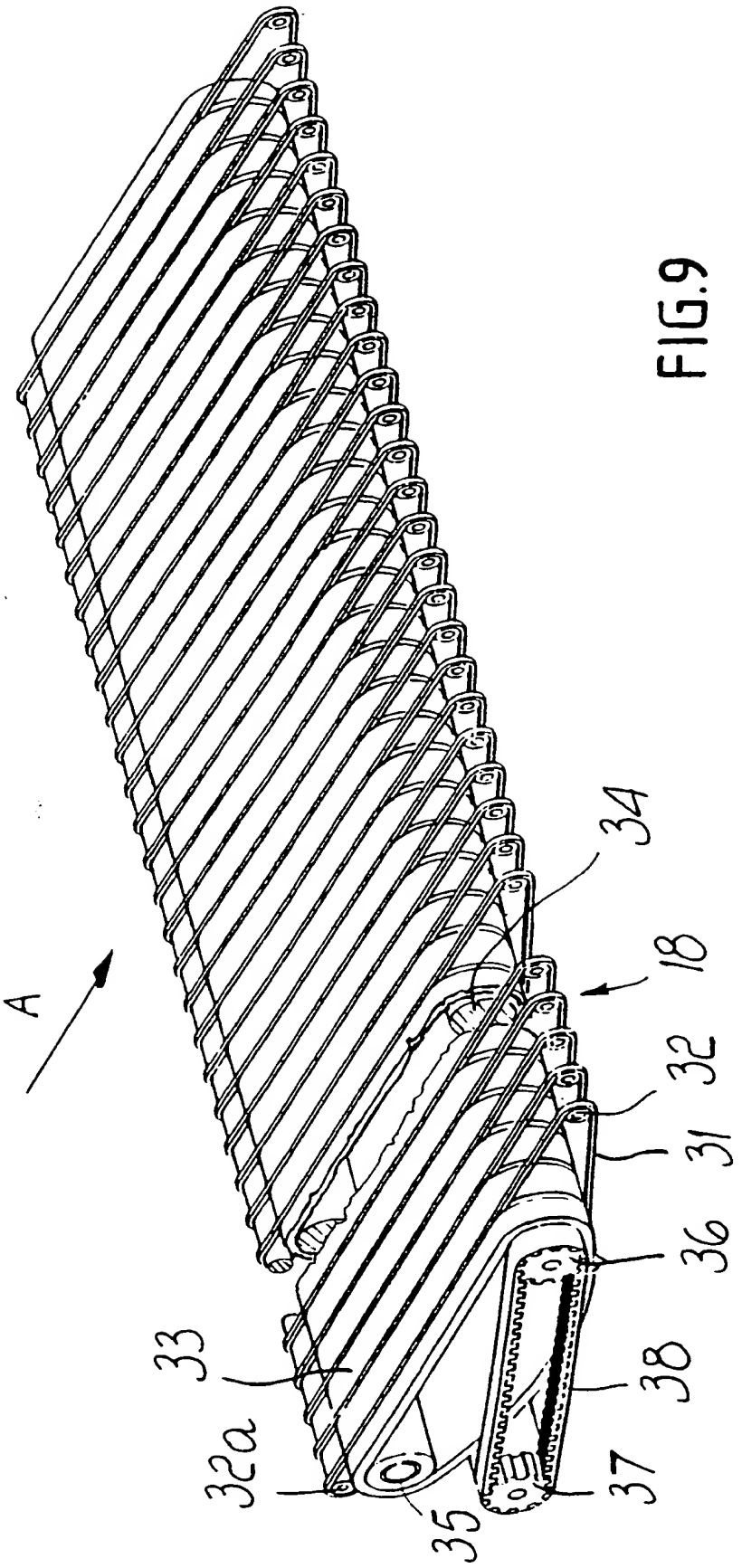

FIG.9

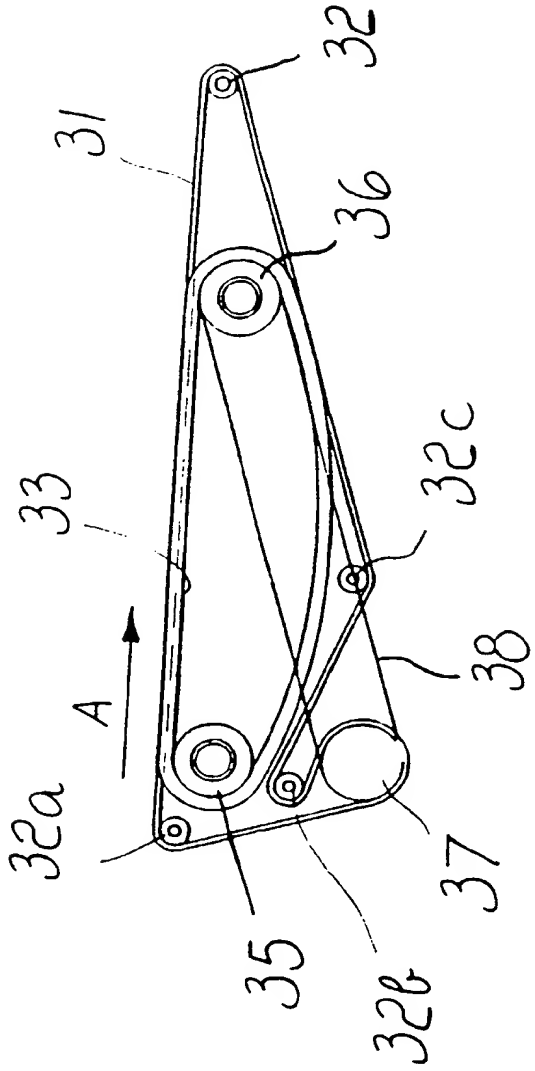

FIG.10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 9338

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	EP 0 495 379 A (CARL NEUMEISTER) * abstract; figures * ---	1.4	B26D7/18
Y A	DD 270 235 A (VEB KOMBINAT OBERBEKLEIDUNG LÖBNITZ) * the whole document * ---	1.4.9 6	
A	US 3 881 379 A (STUMPF) * figure 11 * ---	1	
A	DE 92 14 559 U (KARL MARBACH GMBH & CO.) * page 2, paragraph 3 * ---	1	
X Y	EP 0 453 711 A (SCHÖN & CIE. GMBH) * page 10, line 25 - page 13, line 55; figures * ---	6 7-9.11	
Y	WO 88 10228 A (SANDT AG) * figures * ---	7.8	
A	US 4 247 092 A (DWYER) * figures * ---	10	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
Y	EP 0 327 858 A (MINDA INDUSTRIEANLAGEN GMBH) * abstract; figures * -----	11	B26D B25J B65G B65H A41H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 January 1998	Vaglienti, G

CATEGORY OF CITED DOCUMENTS

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